SOUTHWEST FISHERIES SCIENCE CENTER (SWFSC)
FOURTH QUARTER REPORT-FY 2003
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SUBMITTED BY: Lab Director/Division Director/Group Chief: Norm Bartoo, Division Director (Acting), Fisheries Resources Division.

Title of Accomplishment or Milestone: Stock assessment modeling.

Current Status of Accomplishment or Milestone: The North Pacific albacore assessment continues to receive considerable revisions, e.g., a recently completed meeting in August 2003 with Japan s scientists at the National Research Institute of Far Sea Fisheries in Shimizu, Japan involved developing critical time series that serve as the input data used in the MULTIFAN-CL model. Currently, the albacore assessment has a solid baseline model in place and has received considerable sensitivity analysis. Data exchange issues will be conducted at the next *Intersessional Meeting of the North Pacific Albacore Workshop*, with formal modeling efforts being jointly conducted with Japan during the summer 2004 and stock, fishery, and management results being presented at the *Nineteenth North Pacific Albacore Workshop* to be held in Nanaimo, Canada in December 2004. Efforts have begun to modify the current Pacific sardine model and in particular, modeling research to account for hypothesized migration patterns exhibited by the population, whereby movement from waters off northern Mexico/southern California to more northerly waters off Oregon, Washington, and British Columbia occur on an annual basis. Initial phases of alternative model development have begun for Pacific mackerel as well, with a general modeling platform currently being constructed using ADMB statistical software. The Pacific sardine and mackerel assessment models are to be formally critiqued through the Stock Assessment Review (STAR) process during spring 2004. Finally, continued model evaluation is underway for the market squid assessment, whereby classical spawning biomass per recruit theory is coupled with fecundity estimation of the exploited population to determine sustainable levels of harvest for the marine resource that inhabits waters of the southern California Bight and Monterey Bay a post-doctoral candidate will assist in simulation modeling work over the next year or so.

Background: The Assessment/Modeling Group of the Fisheries Resources Division has the primary responsibility, in concert with work conducted within other Groups at the Center, of spearheading population model research pertaining to fish stocks of the North Pacific Ocean and subsequently, conducting formal assessments for species with Fishery Management Plans currently in place. Ongoing traditional methods of population analysis are conducted for some species (e.g., VPA-based or spawning biomass per recruit-based) and along with development of alternative statistical models, overall assessment-based work provides management objective results for making decisions concerning the status of exploited marine resources of the North Pacific Ocean. The alternative modeling efforts primarily involve ADMB and MULTIFAN-CL, which can accommodate considerably more structure (spatio-temporal details of the available sample information) than the classical assessment approaches. The additional detail accounted for in these assessment approaches allows more objective evaluations to be explored concerning fish- (e.g., natural mortality, growth, and longevity) and fishery-related (e.g., selectivity, catchability, and movement) parameters of interest.

Purpose of Activity: Ultimately, the purpose of the Group s assessment-related activities are to improve the current understanding of the dynamics of the fish populations of the North Pacific Ocean and ultimately, to provide accurate estimates of important fishery parameters needed to manage the stock in sustainable terms, including historical and current estimates of adult biomass, spawning stock biomass, recruitment, and fishing mortality rates. However, the means to the end are also expected to provide

useful information concerning robust vs. sensitive areas of stock assessment methods in general, i.e., by contrasting results generated through two, quite different interpretations of available sample data; general analysis (more reliant on researcher assumptions) and detailed analysis (more reliant on statistical theory).

Description of Accomplishment (e.g., to the Center, to Management, and to NMFS Strategic Plan Goals) and significant results: The North Pacific albacore assessment research has made much progress over the last several months, with baseline models and sensitivity analysis well underway, see North Pacific Albacore Assessment, Third-quarter 2003 Quarterly (Milestone) Report for details associated with specific baseline runs. The beginning phases of alternative model development for Pacific sardine and mackerel are at the stage of formalizing Stock Assessment Teams (STATs), identifying and developing important time series for inclusion in more progressive models, and continuing education regarding modeling platform theory and application. To date, simulation population modeling applicable to the market squid resource off southern California has demanded significant laboratory-based efforts and moderate time demands in terms of analysis/assessment, with both areas of research (laboratory and modeling) to receive substantially more attention over the next year.

Significance of Accomplishment: Ultimately, all assessment-related activities conducted by the SWFSC staff support NMFS strategic plans and fishery management objectives as outlined through legislation (in particular, the Magnuson-Stevens Fishery Conservation and Management Act). That is, in addition to monitoring the abundance and productivity of exploited fish populations inhabiting the North Pacific Ocean, stock assessment research generally provides a quantitative prediction of the consequences of possible alternative management actions. Thus, these overall research efforts and specific assessments provide results that can be used to develop sound, sustainable fishing practices for both commercial and recreational marine fisheries.

Problems: The assessment activities that involve working within an international forum (e.g., North Pacific albacore research) can, at times, be tedious and lack efficiency, given the myriad of countries participating directly (and indirectly) to such tasks. However, persistence and patience usually prove fruitful and have to this time allowed for collaborative working arrangements to be solidified between major nations (e.g., Japan, Republic of China or Taiwan, the South Pacific island nations of the Secretariat of the Pacific Community, etc.) and the SWFSC in La Jolla.

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